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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
CORDRAY, DENNIS R	
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patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Continuation sheet:

Continuation of 11: Applicant argues (pp 6-9) that Lai et al discloses that hydrolyzed polymers prepared from N-vinylformamide monomers are used in amounts from 0.05 to 0.5 wt%, preferably 0.1 to 0.2 wt% and shows that they are not effective as retention aids for fillers such as titanium dioxide in lesser amounts. Example 12 of Lai et al (p 8), cited in support of the argument, compares retention of titanium dioxide using two vinylamine containing polymers of unknown degree of hydrolysis and having molecular weights of 7MM (presumed to be 7,000,000) and 80M (presumed to be 80,000) and two polyacrylamides of differing molecular weight and charge density (it is unknown whether the charge is cationic or anionic). The polymers were added in amounts from 0.01 to 1% (presumably weight percent) based on fiber. The 7MM polyvinylamine demonstrated superior TiO_2 retention at 0.1-0.2% addition. It is noted that the performance of the 80M polyvinylamine is inferior to both the 7MM polyvinylamine and the high molecular weight PAM. The single example using a vinylamine containing polymer of unknown degree of hydrolysis and having a specific molecular weight cannot provide sufficient support that the claimed vinylamine polymer having any molecular weight and a broad range of degree of hydrolysis. Lai et al also does not use calcium carbonate, which is also a claimed filler.

Applicant argues (pp 7 and 9-13) that Utecht et al does not teach that using polymers having amine-containing units as retention and drainage aids and as fixatives for fillers such as titanium dioxide for making all known paper, paperboard and cardboard grades in amounts from 0.01% to 0.1% by weight of the dry fiber. Applicant

also argues that fixing the fillers to the fibers in the pulp is not an inherent or obvious function in the use of a cationic polymer as a retention aid. Applicant recognizes that Utecht et al teaches that its carbamate containing polymers with amine containing units are used as retention and drainage aids and as fixatives for paper stocks which contain contraries in amounts from 0.01% to 0.1% by weight of the dry fiber. Applicant is apparently arguing that the polymers are used as retention aids and fixatives when the materials to be retained in the paper are contraries such as resins, polymeric binders, and other contrary solids and that the polymers are not applicable to fixing fillers such as titanium dioxide and chalk in papers containing large amounts of such fillers. Applicant also argues that Utecht's polymers are used as fixatives for fillers such as chalk and titanium dioxide in much greater amounts than 0.1 to 2%, preferably 0.5 to 1.5% by weight, based on dry paper stock.

Utecht et al is clear that the disclosed polymers have multiple uses by stating that "The carbamate-functionalized polymers are used as retention, drainage and flocculation aids **and also** as fixatives in papermaking (col 6, lines 56-58, emphasis added). As applicant recognizes, the retention, drainage and flocculation aids are preferably used in amounts from 0.01% to 0.1% by weight, based on the dry fiber materials. Applicant also recognizes that the carbamate-functionalized polymers **additionally** have a good fixing effect in such paper stocks as contain relatively large quantities of contraries (emphasis added). Again, Utecht et al clearly discloses the multiple uses of the polymers as general retention, drainage and flocculation aids and additionally as fixatives or fixing agents for contraries. Utecht et al continues, by stating

that "To fix the contraries to the fibers or in the paper, the carbamate-functionalized polymers…are used for example in amounts from 0,001 to 0.1% by weight, based on the dry paper stock." (col 7, lines 2-13). The disclosure of different amounts of polymers to be used as fixing agents then used as retention, drainage and flocculation aids once more teaches the multiple uses of the polymers.

Utecht et al discloses that "The carbamate-functionalized polymers can be used for making all known paper, paperboard and cardboard grades. The papers can be produced from a multiplicity of different fiber materials, for example from sulfite or sulfate pulp in the bleached or unbleached state, groundwood, pressure groundwoods (PGW), CTMP) or waste paper." (col 6, line 62 to col 7, line 2). As discussed in the previous Office Action, Auhorn et al (US 6083348) teaches that "It is well known by those of ordinary skill in the art that vinylamine containing polymers can simultaneously act as retention and drainage aids and as fixing agents (col 2, lines 34-37).

One of ordinary skill in the art would have taken from the disclosure of Utecht et al the teaching that the polymers can be used as retention, drainage and flocculation aids in amounts from 0.01% to 0.1% by weight of the dry fiber for any known paper, paperboard and cardboard, whether containing contraries or not. If the paper furnish contains contraries, the polymers also act as fixing agents for the contraries.

Another use for the polymers is as emulsifiers for preparing filler slurries used in the preparation of filled papers. Suitable fillers are clay, chalk (calcium carbonate), titanium dioxide and kaolin (col 7, lines 14-20). The quantities used for filler slurries are based on the weight of the slurry (which does not contain fibers) and are not related to

the disclosed amount of polymers used as retention and drainage aids based on the fibers. One of ordinary skill in the art would not have equated the weight of a filler slurry with the weight of fibers in paper. The disclosure does teach that calcium carbonate and titanium dioxide are suitable fillers for paper.

Applicant argues (p 15) that Utecht et al does not teach or reasonably suggest that its polymers have any ability to fix particulate fillers on fibers. It is well known in the art that the function of a retention aid is to increase the adsorption of fillers onto the cellulosic fibers or to bind the fillers to the cellulosic fibers (Carr et al, p 1, pars 3 and 4; Varveri et al, col 1, lines 23-29) thus fixing the fillers to the fibers in the pulp is an inherent function in the use of the cationic polymer as a retention aid or, at least, fixing the fillers to the fibers would have been obvious to one of ordinary skill in the art.

Regarding fixing the titanium dioxide or calcium carbonate to the fibers of the pulp, Carr (US 2004/0250972) teaches that "Retention agents are usually introduced into the stock in order to increase adsorption of fine particles, e.g. fine fibers and filler particles, onto the cellulosic fibers so that they are retained with the fibers on the wire." (p 1, par 4). Varveri et al (US 3639208) teaches that "The function of a retention aid is to bind the filler to the cellulosic fibers..." (col 1, lines 26-27). Both references teach that retention aids cause the fillers to be adsorbed or bound onto the cellulosic fibers (fix the filler particles to the fibers of the pulp). One of ordinary skill in the art would realize that fixing the fillers, including calcium carbonate and titanium dioxide fillers, to the fibers in the pulp is an inherent function in the use of the cationic polymer as a retention aid or,

at least, fixing the fillers to the fibers would have been obvious as the intended function of the retention aid.

From the combined teachings of the prior art, one of ordinary skill in the art would have found it obvious to add the carbamate-functionalized polymers in the claimed amount as retention and drainage and flocculation aids to a papermaking slurry containing fillers such as calcium carbonate and titanium dioxide and that the polymers would fix the fillers to the fibers of the pulp.

The rejections of Claims 4-9 over Utecht et al in view of others is maintained.

/Dennis Cordray/

Examiner, Art Unit 1741

/Matthew J. Daniels/

Supervisory Patent Examiner, Art Unit 1741